

1 **ABSTRACT**

2 A scalable video transmission scheme is provided in which client
3 interaction and video content itself are taken into consideration during
4 transmission. In content-based video representation such as MPEG4, incoming
5 video is typically segmented into multiple objects. Each encoded object bitstream
6 includes: control, motion, shape and texture information. Different parts of the
7 information, however, have different priorities within a receiving decoder. For
8 example, shape or motion information is usually more important than texture
9 information. Methods and arrangements are provided to prioritize/classify
10 different types of information according to their importance and to packetized or
11 otherwise arrange the prioritized in a manner that lower priority information may
12 be dropped during transmission should the need arise. Thus, when network
13 congestion occurs or there is not enough network bandwidth to transmit all of the
14 prioritized information about the object, some information, i.e. that with lower
15 priority is dropped at the server or at an intermediate network node to reduce the
16 bit rate. Thus, when the server transmits multiple video objects over a channel of
17 limited bandwidth capacity, the bit rate allocated to each object can be determined
18 according to several factors, such as, e.g., the type/complexity of the video object
19 information, the high-level semantic information of the video object's content and
20 user interactivity behaviors. Additionally, since it can save network bandwidth
21 greatly, multicasting is considered as an effective communication support for
22 multi-party multimedia applications such as distance learning and video
23 broadcasting. However, due to the heterogeneity of the Internet a single sender
24 transmission rate cannot satisfy the different bandwidth requirements at different
25 receiving sides. Therefore, the sender rate is usually adapted to the requirement of

1 the worst positioned receiver, thereby reducing the quality of the data perceived at
2 all receiving sites. This limitation can be overcome using layered transmission
3 mechanisms. However, in layered approach each layer needs a separate network
4 session, and it is complicated for the network to maintain multiple sessions for
5 each video object and the synchronization control between different layers is
6 difficult to achieve. Furthermore, the transmission rate cannot be adjusted in the
7 granularity smaller than the difference between layers. To solve the above
8 problems, new heterogeneous multicasting methods and arrangements are
9 provided, in which a single layer approach can be employed having the advantages
10 of a layered solution. For example, a Video Transmission Agent (VTA) and a new
11 resource allocation policy (Capacity, Requirement) policy are provided for use
12 within a multicasting arrangement.